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P R E F A C E.

THE present volume contains a description, more or less detailed, of the various inventions that, during the last session, have received the approbation of the Society. In offering these to the free use of the public, one great object of the Institution is fulfilled, at the same time that the non-resident members are hereby furnished with the means of forming some estimate of the activity of the Society, and of the judgment with which the funds placed at its disposal have been employed.

In the class of Agriculture and Rural Economy, the large silver medal has been given to Mr. Stickney, of Ridgmont, near Hull, for a variety of ray-grass. The Society have at various times bestowed rewards, both honorary and pecuniary, for ameliorating the pasture grounds of this country, either by the discovery and introduction of new species or varieties of grasses, or by the selection of the best

and most profitable of those which constitute the miscellaneous herbage of our natural meadows. Mr. Stickney's ray-grass is of the latter class; he has for several years cropped many acres with it, both alone and intermixed with clover; and the Society trust that they are benefitting the public, in recommending its use on soils similar to those on which it has been so profitably cultivated by Mr. Stickney.

The silver Ceres medal has been awarded to Mr. Milton, for a double bee-hive, with a revolving partition, whereby the bees may be commodiously excluded from the upper part previous to taking away the honey.

And the thanks of the Society have been voted to J. Smith, Esq., of Revel End, near St. Alban's, Chairman of the Committee of Manufactures, for the experiments made, and still making, by him, on a variety of autumn sown beans, for the introduction of which Mr. Taunton, a few years ago, received the Society's reward.

In the class of Chemistry, the large silver medal has been awarded to Mr. Abraham, of Sheffield, for

a new and ingenious mode of neutralizing or dispersing the magnetism which the balances of watches are sometimes found to possess, and which entirely destroys the truth of their going.

The silver Vulcan medal and ten guineas have been voted to Mr. Roberts, for his improved safe-lamp for miners. The only objection to the use of Sir H. Davy's safe-lamp is, that the wire gauze which incloses the flame obstructs a large proportion of the light. This inconvenience is greatly aggravated from the circumstance, that when the lamp is held very obliquely the oil flows out of its receptacle, smears over the surface of the gauze, and thus causes the smut and dust to adhere, till the interstices between the wire are more or less clogged up, and the light almost wholly obscured. To prevent this very serious inconvenience, Mr. Roberts has adapted a hemispherical cover to the oil vessel, which receives whatever may flow out of it when the lamp happens to be laid on its side.

In the class of Polite Arts, the sum of five guineas has been given to Mr. Cathery, for a new mode of executing ornamental work on ivory. Boxes and

other articles of ivory are often ornamented by designs in black, which contrast agreeably with the whiteness of the ground. This is effected by engraving the design with the usual tools, and then filling up the lines with black varnish ; but the expense of this kind of work, if well done, is considerable, and the stiffness of the design so produced renders it of little value as a work of art. Mr. Cathery covers the surface of the ivory with engravers' varnish, then etches his design with the needle, and afterwards pours on a solution of nitrate of silver. Wherever this solution touches the ivory, an indelible black or brown stain is produced, without any sensible corrosion. The piece, therefore, will receive a perfect and even polish ; the ornamental designs will be much freer and better as works of art ; and at the same time a great saving of labour will be effected.

Mr. W. Cooke, Jun. and Mr. Humphrys, both engravers, have each had a gold Isis medal awarded to them for improvements in etching on steel plate. This material, when compared with copper, possesses the two great advantages of admitting finer work to be placed upon it, and of giving a much greater number of good impressions. The late Mr. Warren

was the first person whose endeavours to engrave on steel plate were sufficiently successful to attract the notice of his brother artists; and with the liberality which usually accompanies real genius, he communicated to the public, through the Society, of which he was a distinguished member, the results of his expensive and laborious investigations. Subsequently Messrs. Perkins and Heath, Mr. Lupton, and Mr. Turrell, communicated, through the same channel, a variety of extremely useful information on the preparation of the plate, the composition and mode of applying the varnish, and the various menstrua that may be used for biting-in after etching. The two artists who last year received the Society's rewards have also each of them communicated the successful results of their experiments, which will contribute to the farther progress of this as yet new art, and will, it is hoped, add another obligation on the part of the public, towards an institution from which all the information on this subject has hitherto emanated.

The silver Isis medal has been voted to Mr. Galpin, of Charmouth, for his very ingenious application of pulverised black-lead to the production of certain effects in pencil drawings, which can neither be ex-

pressed nearly so well in the usual way, nor with any thing like the same degree of expedition. Artists in this line will, for the future, feel themselves much obliged to this gentleman for the liberality with which he has made known to the Society all the particulars of his process.

The silver Isis medal has been voted to Mr. Tuson, modeller to the Horticultural Society, for his wax models of fruits and other vegetable productions. The unrivalled accuracy of the specimens, both in form and colour, and the permanency of this latter, it being unaffected by exposure to air, and by frequent handling, render such models the best and truest representations of their originals; and they no doubt will hereafter be appealed to as authority in disputed cases.

The large silver medal has been voted to Mr. Douglas Fox, of Derby, for his material for moulds. Clay, Paris plaster, and wax, are the materials employed in making moulds for plaster casts. The two former have no pliability; and the latter, though pliable, is not elastic. On this account, when the substance to be moulded is of a very uneven surface,

with undercut parts, as they are technically called, it is impossible to separate the mould from the original, except in many pieces; and where the orifice of a depression is narrower than its bottom, it is manifest that in such circumstances a mould can be only very imperfectly obtained. To join together, with accuracy, the numerous pieces of a complicated mould, requires much address, time, and experience, and it often fails in the hands of the best artists. Mr. Fox employs, as the material of his moulds, common glue, as thick as possible, consistent with the requisite degree of fluidity. In a short time it becomes solid, and being then divided into two or three pieces, parts readily from the most intricate and undercut surfaces, in consequence of its softness and elasticity. From such moulds casts may be obtained, in the usual way, of extreme delicacy and perfection.

It is now three years ago since the Society first began to offer premiums in this class, expressly for surgical students. They were induced so to do in consequence of its being represented to them that many cases of diseased parts, or of malconformation, occur, which it would be highly interesting and instructive to preserve a record of, but which are lost

to the profession, because the practitioner in attendance is incapable of making a visible representation of appearances which no words can intelligibly describe. It was also considered desirable to endeavour to introduce into this country the art of modelling in coloured wax, the parts of the human body in their natural, morbid, or dissected states, the many advantages of which will be manifest to all conversant with such studies. The appeal of the Society to the junior members of the profession has not been made in vain. Mr. J. R. Alcock sent in a model in coloured wax, of a dissected arm, so well executed as to entitle him to the gold medal; the large silver medal was given to Mr. Jos. Towne, for a very beautiful small model of a skeleton.

In the class of manufactures, the Society voted their large silver medal to Miss Pether, for some samples of English silk produced the year before last. The worms were kept in a south room, but without any artificial heat, and up to the period of their last change of skin were fed solely with leaves of the cabbage lettuce. The quality of the silk, according to the testimony of the brokers and manufacturers to whom it has been shown, is superior to that of Ben-

gal, and equal to some kinds of Italian silk. If Miss Pether's success should induce any persons to make farther trials, on a larger scale, the Society recommend them to select, for breeding, the moths produced from the largest and hardest cocoons of a full yellow or orange colour.

It is with great satisfaction that the Society observe the rapid improvement which has taken place in the manufacture of hats and bonnets of British Leghorn; and they think that they may fairly take some credit to themselves for the zealous and liberal encouragement which, for the last four years, they have bestowed on this subject. As a means of bettering the condition of a very numerous and deserving class, the labourers in husbandry, by offering a healthy, clean, and profitable employment to the female part of their families, this manufacture well merits the most effectual patronage of the British public; not such a kind of patronage as often induces benevolent persons to put up with inferior articles from charitable motives, but that rational encouragement which is not led away by a word, and is more attentive to the quality of the product than to the real or imposed name which it bears. Several thousand hats, of do-

mestic manufacture, have this spring been sold under the name of Italian, their quality being nowise inferior to the average samples from Leghorn. It is time, therefore, that the ladies of England should now interpose their powerful authority, and allow henceforth no distinction in these articles except of quality.

The sum of ten guineas, the premium offered, has been awarded to Mr. Long, the master of Barham House of Industry; and bounties have been given to the following competitors for the same premium, in proportion to the merit of their respective productions; namely, to S. Manwaring, of Bennenden; to Frances Cobbing, of Bury St. Edmunds; to Mrs. Ingledon, of Aldborough. The premium of ten guineas for the best plat of British material and manufacture, has been awarded to Mr. J. Horne, of Kenninghall; and the sum of five guineas to Mrs. Lowrey, of Exeter, for a new article, namely, a hat made of double split straw. Finally, a large silver medal has been awarded to Messrs. Muir, of Greenock, for the great zeal with which they have largely engaged in the manufacture, and for the admirable quality of hats made by them from the straw of rye grown in

Orkney, and platted by the female population of those islands.

Of the articles rewarded in the class of Mechanics, the two first are for improvements in tools, a kind of claim to which the Society always turns a favourable ear. Improvements in these must consist either in a reduction of their cost, or in an increased precision or rapidity of working. Now, although the gain on the price of each individual instrument, or on each class of work done by it, be but small; yet if this be multiplied by the number of such instruments in use, and by the number of days in the year, the sum of advantage thus gained by the community will in many cases amount to a quantity far superior to that which is produced by more elaborate inventions.

The silver Vulcan medal has been awarded to Mr. Collett, for an ingenious and simple pair of sheers, by which the slips of tin plate, of which the tags of laces for boots and other purposes are made, are bent in the act of being cut off. Two steps in the manufacture of these articles, heretofore distinct, are thus combined into one.

The sum of five guineas was given to Mr. Hooper, for an improved builders' level. The inventor is employed in superintending the works at the new palace in St. James's Park; and finding that in high and exposed situations the common bricklayers' level is inconvenient, from its bulk and incorrect form, the plummet swinging with the wind, has avoided both these objections, by an adaptation of the spirit-level to this purpose.

'The large silver medal was voted to Mr. C. Hartley, for a very ingenious and simple hand-rail sector. To determine the curve of a hand-rail, winding round a well staircase, so as to cut it out of the rough wood with the least possible waste of material, is a problem in practical geometry which few carpenters are equal to. Mr. Hartley has greatly simplified the business by the invention of a machine which supersedes the geometrical construction heretofore necessary, and has thus brought it within the reach of any intelligent workman possessed of the elements of calculation.

The gold Vulcan medal was given to Mr. W. Spencer, of the Royal Dock-yard at Chatham, for his

method of letting go an anchor, an improvement sanctioned by the order given for its general adoption in the navy, and enabling a most important and often very critical manœuvre to be performed with great speed and precision, and without incurring the hazard of injury to the persons employed in it.

Another naval improvement has been communicated by Mr. Carey, of Bristol, surveyor of shipping, for which the Society have bestowed their silver Vulcan medal, consisting in the adaptation of half sheaves to the dead eyes. The lateral ropes, or shrouds, which support the masts, and also form the rope-ladders, are brought up to their proper degree of tension by means of the blocks called dead eyes; the wear both on the ropes and blocks, on account of the angular edges of the holes in the blocks, is often very injurious, and may occur in circumstances when the mischief cannot easily be repaired. Mr. Carey has inserted a half sheave of lignum vitæ in each of these holes, by which the wear is greatly reduced.

The silver Vulcan medal was awarded to Mrs. Henry Goode, of Ryde, in the Isle of Wight, for her ingenious and simple blind for the circular heads of

windows. Every one must have witnessed the annoyance produced by the entrance of strong sunshine through the circular heads of the large windows in churches, courts of justice, and other places of public resort, and the awkward contrivances for blinds to these parts. Mrs. Goode's blind is simple in construction, is closed or extended with the greatest ease, is not seen except when in use, and interferes in no degree with the symmetry of the building.

The sum of thirty guineas was awarded to Mr. Skinner, for a model of a stage coach, which in combining safety, ease of draft, and accommodation to the passengers, appeared, by the testimony of professional coach-builders and wheelwrights, to deserve this mark of the Society's approbation. The same candidate has also had the sum of five guineas voted to him for a trap for vermin, whether rats, mice, or other quadrupeds. The novelty of this trap is, that it sets itself. The animal in tugging at the bait draws out the support of the floor, and is itself precipitated sideways into a chamber below; the floor rights itself again by means of a counterpoise, and the support of the floor returns to the place whence it had been drawn out by the animal.

The sum of fifteen guineas was voted to Mr. Joshua Jenour, jun. for his shot-cartridge. When a charge of shot leaves the muzzle of a gun, the impulse communicated by the explosion of the powder is opposed by the resistance of the air, and attraction of gravity; in consequence of which it comes to the ground, after describing a parabolic curve longer or shorter according to the force originally impressed on it; and from the commencement of the flight the grains of shot begin to diverge at a greater or less angle, in proportion to the deviation of their respective figures from a perfect sphere. Many attempts have been made, by inclosing shot in cartridges of paper, of linen, and other materials, to increase their range and diminish their divergence; but as yet with small effect, probably because the cartridge is ruptured almost immediately on its leaving the gun. Mr. Jenour constructs his cartridge of two semi-cylinders of thin copper, grooved like a screw externally. These, being applied to each other, are secured by means of a thread wound round, and fitting the groove of the screw. The shot is poured into the cylinder through a hole at one end, which is afterwards closed. Previous to dropping the cartridge into the gun, the end of the binding thread is loosened, the consequence of which is, that

as soon as the cartridge is discharged the thread begins to unwind ; and, as soon as completely unwound, the two halves of the cylinder separate and fall to the ground, and the shot begins to disperse. It was ascertained by experiment, that a charge of powder which would carry a given quantity of shot fifty yards, would carry the same weight of shot inclosed in the cartridge, a hundred yards. The separation of the cartridge depends on the unwinding of the thread, and this is regulated by its length, and perhaps by other circumstances. Further observation and experiments will be necessary, to ensure the requisite degree of precision in this respect ; but the novelty, ingenuity, and probable utility, have been considered as establishing a fair claim to the Society's reward.

The silver Vulcan medal has been given to Mr. J. Adcock, for an adjustable lever for closing swing doors.

The silver Vulcan medal and ten guineas have been voted to Mr. Towson, of Devonport, for his banking for chronometers. The intention of a banking is to limit the motion of the balance, when, from any concussion or shaking of the machine, this part, or the

spring with which it is connected, are liable to injury: this may be done by a stud or pin, which produces its effect by a sudden stop or impulse; or by a pressure on the spring, which limits the inordinate motion in a more gradual manner. Both these methods, however, are extremely liable to affect the rate of the clock, so that in some of the best timekeepers of modern construction the banking is wholly omitted: the machine, however, is hereby liable, not merely to have its rate of going affected, but to be seriously injured in its works by a violent shock. Mr. Towson's banking comes into action only when the balance oscillates to the amount of about a circle and three quarters; and as under these circumstances (even if there were no banking) the rate would be affected, Mr. Towson's invention only prevents farther mischief when the oscillation has already become inordinate.

The large silver medal has been voted to Mr. W. Palmer, for an improved slide and carriage to the engravers' ruling-machine, by which its accuracy is improved and its cost diminished; an invention of no small importance, when it is considered how largely ruled lines are now introduced into almost all kinds of engraving.

The sum of ten guineas has been awarded to Mr. J. Alderson, for an arcograph or instrument for describing arcs of large circles, the centres of which are not given. It will be found a very convenient instrument to architects and others who have occasion to make working drawings on a large scale.

The sum of five guineas has been voted to Mr. D. Magson, for a float valve and stand-pipe for water mains. The float valve answers the same purpose as the common ball-cock for cisterns; is less likely to get out of order, and from an equal orifice furnishes a more copious supply of water. It has been tried and approved by some water companies, and is advantageous both to the buyers and sellers of this necessary of life.

To Mr. G. Edwards, of Lynn, the gold Vulcan medal has been awarded for an ingenious levelling and surveying instrument. The perambulator measures longitudinal distances by the revolution of a wheel, the circumference of which is known, and a common watch train, with pointers indicating the number of revolutions. To a machine of this kind Mr. Edwards has connected a sliding bar, with uni-

versal joints, terminated by a tracing or dotting wheel, which describes, on a piece of paper placed below it, a straight line, bearing a certain known proportion to the distance passed over by the perambulating wheel. A heavy pendulum is connected, by means of a very ingenious parallel motion, with the tracing wheel, so as to give it a direction upwards or downwards, proportioned to the obliquity of the surface over which the wheels of the machine are passing. Thus the line described by the tracer shows by its length the distance travelled, and by its variation from a horizontal line the altitude and depression of all the points in that distance, compared with the point from which the machine started. An experiment was tried in presence of a committee of the Society, on ground previously levelled according to the usual mode, with a perfect coincidence between the two results.

Three medals have been awarded for improvements in surgical instruments. Such subjects are only capable of being duly appreciated by professional men; and the Society in these, as in all similar cases, have been guided by the written certificates and oral testimony of those, both in and out of the Society,

who are best qualified on such subjects to direct their decisions.

The medals alluded to are the large silver medal to Mr. Fay, for his instruments for the use of dentists; the gold Vulcan medal to Mr. Holmes, for his craniotomy forceps; and the silver Vulcan medal to Mr. Clark, for his cupping glasses.

In the practice of veterinary surgery, injuries, often very serious, sometimes fatal, are experienced by horses, from the method of casting or throwing them on the ground preparatory to an operation. The stooping and constrained posture in which the surgeon is consequently obliged to place himself, added to the consciousness of the hazard which he is running of personal injury from the violent struggles of a powerful animal when in great pain, naturally render the performance of such operations less complete than they would be under circumstances more favourable to the address and self-possession of the surgeon. Mr. Goodwin, clerk of the stables to his majesty, and of large personal experience in veterinary practice, has invented a table, to which a horse may be secured without injury to himself, or the risk of injury to the

operator, which is very manageable, considering its bulk, and, with some simplification of the apparatus, will probably be found of great advantage. The Society have awarded to this gentleman their gold Vulcan medal.

The silver Vulcan medal and five guineas have been awarded to Mr. S. Williams, for his drag for raising drowned bodies. Submersion for a very few minutes is in almost all cases fatal; and the cumbrousness of most drags is such, that life is irrevocably past away before they can be put in operation. The great lightness and portability of Mr. Williams's apparatus were the motives that induced the Society to recommend it to the public.

To diminish the hazard of life or limb which attends many occupations, has always been an object of much solicitude with the Society; and of these the business of dry grinding, as performed on needles, card wires, and many articles of cutlery, is perhaps the most unhealthy that is carried on. The particles of dust and of steel fill the grinding rooms with a dense cloud, which, being inhaled, occasions irritation of the lungs, and terminates in asthma or consump-

tion. For an effectual mode of preventing the dust from annoying the workmen the Society offered their large gold medal. This has been claimed by Mr. Cowen, of Carlisle, for his machine for card grinding, which, from inspection of the model, and from very satisfactory testimonials of its complete success in practice, seems to leave nothing further to be required.

In the class of Colonies and Trade—the gold Ceres medal was awarded to M. Barbe, of the Mauritius, for importing seventy-six tons of cocoa-nut oil.

It is now some years since the attention of the Society was drawn to the oil of the cocoa-nut, from the abundance in which it may be procured in almost all our intertropical colonies and possessions. Besides recommending it to the investigation of the public, there was inserted in the 34th volume of the Transactions a description and engraving of a hydrostatic press, adapted by Mr. Bramah to the expression of this oil. The subsequent discovery, that the whitest of all artificial flames is produced in the combustion of gas from the cocoa-nut oil, induced the Society to offer a gold medal for the importa-

tion of a certain quantity of it from any British colony.

It had been observed, that in many cases leakage to the amount of twenty and even thirty per cent. had occurred from casks of cocoa-nut oil, to the great detriment of the shipper, and to the serious injury of other articles, especially sugars, contained in the hold of the same vessel. Mr. Huxham, of Travancore, has shown how this may be, for the most part, avoided by a careful attention to the cooperage of the cask, after they have been filled. The thanks of the Society have been voted to this gentleman, and his communication is inserted in the present volume.

James Henderson, Esq. his majesty's consul general in the state of Columbia, has sent to the Society a box of the bark of a species of *Cinchona*, very abundant in the neighbourhood of Pitayo. This, on examination (at the request of the Society) by Mr. H. Hennell, one of the members, and superintendant of the laboratory at Apothecaries' Hall, appears to be richer in Quinia than the bark in common use, and will probably become an article of considerable commercial importance.

The Society have also received a number of articles from South America, collected and presented by the Rev. James Thomson. A descriptive catalogue of them is inserted in the present volume; and such of the articles as deserve it will probably receive a more detailed examination in the course of the present session. Some time ago a few bottles of liquid lacquer, from the Burman country, were sent to the Society by H. T. Colebrooke, Esq. which that gentleman had received from Dr. Carey, of Serampore. From the experiments made on this substance, by direction of the Society, it appears to be very doubtful how far it is capable of being advantageously used by English artists. It has, however, been thought proper that the information obtained on this matter should be communicated to the public.